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ABSTRACT

Past research has established clear behavioral differences between Type A and Type B individuals. The manner in which these behavioral differences are represented in the self-definitions of Type As and Bs was examined in a group of 42 college students. The existence of Type A and B self-schemata was investigated using two tasks designed to measure the influence of these hypothetical structures on speed of processing and memory interference. During an initial task, Type As and Bs made self-relevant decisions (Like Me, Not Like Me) in response to trait adjectives previously scaled as Type A, Type B, or neutral in content. Reaction times for the decisions were measured and results indicated that both Type As and Bs made faster decisions for schema-compatible responses than for schema-incompatible responses. On a second task, Type As and Bs were tested for recognition memory after attempting to memorize half of the aforementioned trait list. Memory errors were examined and indicated that Type As and Bs made more errors compatible with their respective self-schemata. These results indicate that a Type A and B distinction forms a reliable organizing framework for the self-definitions of Type As and Bs. (Author/NRB)

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Self-Schematic Representation of the Type A and B Behavior Patterns

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Running head: Type A/B Self-Schemata

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Abstract

Past research has established clear behavioral differences between Type A and B individuals. The purpose of the present research was to examine how these behavioral differences are represented in the self-definitions of Type As and Bs. The existence of Type A and B self-schemata was investigated using two tasks designed to measure the influence of these hypothetical structures on speed of processing and memory interference. During an initial task, Type As and Bs made self-relevant decisions (Like Me, Not Like Me) in response to trait adjectives previously scaled as Type A, Type B, or neutral in content. Reaction times for the decisions were measured and results indicated that both Type As and Bs made faster decisions for schema-compatible responses than for schema-incompatible responses. On a second task, Type As and Bs were tested for recognition memory after attempting to memorize half of the aforementioned trait list. Memory errors were examined and indicated that Type As and Bs made more errors compatible with their respective self-schemata. Taken together, these results indicate that a Type A and B distinction forms a reliable organizing framework for the self-definitions of Type As and Bs. The existence of stable cognitive structures that parallel the behavioral differences between Type As and Bs has important implications for both theory and application.

Self-Schematic Representation of the Type A and B Behavior Patterns

Past medical research has validated the important role of the Type A behavior pattern in the etiology of coronary heart disease (e.g., Cooper, Detre, & Weiss, 1981; Dembroski, Weiss, Shields, Haynes, & Feinleib, 1978; Haynes, Feinleib, & Kannel, 1980; Rosenman, Brand, Jenkins, Friedman, Straus, & Wurm, 1975), and psychological research has verified its three major components: Type A individuals are more achievement striving, time urgent, and hostile than their Type B (noncoronary-prone) counterparts (for reviews see Glass, 1977; Matthews, 1982). More recently, research has focused on the manner in which Type As and Bs attend to, process, and respond to information from the environment. For example, it is now apparent that Type As and Bs differ in the attention they allocate to task-relevant and task-irrelevant stimuli (e.g., Carver, Coleman & Glass, 1976; Matthews & Brunson, 1979; Strube & Lott, in press; Strube, Turner, Patrick, & Perrillo, 1983; Weidner & Matthews, 1978, see also Humphries, Carver, & Neumann, 1983), their interpretations of the performance of others (e.g., Smith & Brehm, 1981; Strube & Werner, in press), and their interpretations of their own performances (e.g., Brunson & Matthews, 1981; Rhodewalt, 1984; Strube, in press). Consequently, emerging theoretical views on Type A and B behavior have a decidedly cognitive flavor and appear to share an emphasis on the manner in which Type As and Bs evaluate themselves and respond to self-relevant information (cf. Matthews, 1982, p. 312-313; Price, 1982). Crucial to such formulations is knowledge of how Type As and Bs organize information about their own behavior. Accordingly, the purpose of the present two studies was to examine whether Type As and Bs have coherent cognitive representations, or self-schemata, of their behavioral styles.

The Organization of Self-Knowledge

Social cognition research has firmly established the existence of cognitive structures, or schemata, that aid in the processing of information from the social world (e.g.,

see Cantor & Mischel, 1977; Fiske & Taylor, 1984; Markus, 1980; Wyer & Carlston, 1979). Schemata represent cognitive generalizations based on past experience with objects, events, or people to which we are frequently exposed. The presumed advantages of schemata are the provision of efficiency in information processing (not all information is or need be processed), the organization of a bewildering array of stimuli into coherent knowledge structures, and the enhanced future utilization of information. Given that much information processed by individuals is related to the self, it is not surprising that cognitive structures have been identified which serve to organize self-knowledge. In fact, it has been suggested that these self-schemata are central to the processing of all social information, and that an adequate understanding of how individuals make sense of their social world is intimately tied to how they make sense of their own behavior (cf. Markus & Smith, 1981; see also Rogers, 1981).

Empirical research has demonstrated the existence of self-schemata in several domains (e.g., Ingram, Smith, & Brehm, 1983; Crane & Markus, 1982; Markus, 1977; Markus, Crane, Bernstein, & Siladi, 1982; Markus & Smith, 1981; Mills, 1983) and has indicated a number of reliable consequences of self-schemata on the processing of self-related information (Bargh, 1982; Cacioppo, Petty & Sidera, 1982; Kernis, 1984; Kuiper, 1981; Kuiper & Rogers, 1979; Miller, 1984; Rogers, Kuiper, & Kirker, 1977; Rogers, Rogers, & Kuiper, 1979). For example, individuals who have a schema in a particular domain can process schema-compatible information more quickly, can readily retrieve schema-compatible information from memory, can confidently predict their future behavior in the relevant domain, and resist schema-incompatible information (Kendzierski, 1980; Markus, 1977; Markus & Smith, 1981). In addition, self-schemata can produce reliable memory distortions (e.g., Rogers, Rogers, & Kuiper, 1979). Several of these characteristic features of self-schemata will be used in the present study as the basis for examining Type A/B differences in self-definition.

Type A/B Self-Schemata

As noted previously, much psychological research has focused on the different ways that Type As and Bs process and respond to self-relevant information. The verification of Type A/B content differences in the organization of self-knowledge would provide an important complement to this research and establish the existence of a cognitive component critical to the development of a general cognitive-behavioral model of Type A and B patterns.

By investigating the presence/absence of Type A/B self-schemata this study will address an additional issue of importance within the Type A literature. Specifically, there has been an emphasis on the understanding of Type A behavior at the expense of understanding Type B behavior. Indeed, Type B behavior is often defined as the relative absence of Type A characteristics. In some respects, this biased emphasis is not surprising: It is the Type A individual who is coronary prone. From a theoretical standpoint, however, a thorough understanding of Type B behavior is critical. A useful starting point is to determine whether the Type B pattern is a coherent, organized entity in the cognitive structure of Type Bs, or, simply a convenient catch-all label used by researchers to characterize individuals who do not exhibit Type A behavior. It is entirely possible that Type B behavior is not seen as an important invariance by individuals labelled as Type B. This would imply that the Type B label is more a theoretical and methodological convenience than a reflection of reality, with important implications for explanations of Type A/B differences. Thus one outcome of this research will be an indication of whether it is appropriate to consider both the Type A and B patterns as well-organized behavioral styles reflected in cohesive cognitive organizations of self-knowledge.

Self-Schema Detection

In the present study, two tasks were used to provide converging evidence for the presence of Type A/B self-schemata. The first task was modeled after the trait endorsement procedure developed by Markus (1977; see also Markus, Crane, Bernstein, &

Siladi, 1982). In this procedure subjects respond to a list of trait adjectives by pressing one of two buttons labelled "Like Me" and "Not Like Me". The traits are selected for their relevance to the self-schema domain under study, and the reaction time for each endorsement is measured. As Markus (1977; Markus et al., 1982) has demonstrated, decisions compatible with the underlying self-schema are made more rapidly than schema-incompatible decisions. In the present study, Type As and Bs (as defined by standard questionnaire assessment) responded to traits from three lists: Type A, Type B, and neutral. If Type As organize their self-knowledge along the Type A/B dimension then their reaction times for schema-compatible responses (Type A word - Like Me, Type B word - Not Like Me) should be faster than their reaction times for schema-incompatible responses (Type A word - Not Like Me, Type B word - Like Me). Likewise, if Type Bs organize their self-knowledge along the Type A/B dimension then their reaction times for schema-compatible responses (Type B word - Like Me, Type A word - Not Like Me) should be faster than their reaction times for schema-incompatible responses (Type B word - Not Like Me, Type A word - Like Me). Type As and Bs should not differ in their reaction times to neutral words (irrelevant to the Type A/B dimension).

The second task examined the presence of self-schemata via their influence on recognition memory. Rogers, Rogers, and Kuiper (1979) have shown that the enhanced accessibility of schema-relevant information can lead to reliable interference on a schema-irrelevant memory task (i.e., the false alarms effect). In the present study, subjects were asked to memorize half of the adjective list on which they had previously made their Like Me - Not Like Me endorsements. Subsequently, the entire list was shown to the subjects who had to judge whether a given word was on the prior memory list. The false positive errors were classified according to whether they were consistent with a Type A self-schema or a Type B self-schema. For example, a Type A false positive error would occur if a Type A trait previously endorsed as Like Me (or a Type B trait previously endorsed as Not Like Me) was incorrectly recognized as having been on the

memory list. The assumption behind false positive errors is that their accessibility in memory (due to their presence in the self-schema) makes them more likely to intrude into the recognition task. If Type As organize self-knowledge along the Type A/B dimension then they should make more Type A schema-compatible errors than Type B schema-compatible errors. Likewise, if Type Bs organize self-knowledge along the Type A/B dimension then they should make more Type B schema-compatible errors than Type A schema-compatible errors. Although there is no precedent in past research, we also examined whether self-schemata influenced the proportion of false negative errors. For example, subjects may be less likely to recognize a word previously rated in a schema-incompatible manner.

In summary, the present study examined the self-schematic representation of Type A and B behavior among Type A and B individuals by investigating the speed of self-relevant decisions and the interference of self-schema content on memory performance.

Study 1

Method

Overview

Male and female undergraduate volunteers participated in what was described as a study examining self-concept and its relationship to task performance. During an initial phase of the study, subjects completed a 66-item trait adjective rating scale and a questionnaire measure of the Type A and B behavior patterns. During a second phase (at least two weeks following the initial phase), subjects were tested individually on a series of cognitive and behavioral tasks designed to elicit Type A/B differences. The series included an adjective endorsement task where reaction times were assessed, a task where solution of simple math problems was examined, a time estimation task, and a recognition memory task.

Subjects

Forty-two undergraduate volunteers (17 males and 25 females) participated in the study. Average age of the sample was 20.8 years.

Word Lists

The study used lists of Type A, Type B, and neutral self-descriptive words that were generated during a pilot phase of the research. An initial list of 335 adjectives was generated using previous compilations (e.g., Anderson, 1968), dictionaries, and the investigators' knowledge of Type A and B patterns. A panel of five judges, knowledgeable in the characteristics of Type As and Bs, independently rated each word according to whether it was clearly characteristic of Type As, Type Bs, or neither exclusively. Words on which there was complete agreement (100%) were retained, resulting in a list of 25 Type A words (e.g., competitive, driven) and 23 Type B words (e.g., relaxed, patient). Removal of near-duplicate words resulted in two word lists each composed of 22 self-descriptive adjectives. A list of neutral words was constructed from words that could not be classified as clearly Type A or Type B in content (e.g., creative, religious). The neutral list also contained 22 words. Next, a group of 20 undergraduates (from the same population as that used in the present study) rated all 66 words (randomly ordered) on 5-point desirability and meaningfulness scales. Pertinent to interpretations of endorsement rates, the three lists were comparable in their rated desirability (Type A list, $\underline{M}$ = 3.47, $\underline{SD}$ = .91; Type B list, $\underline{M}$ = 3.70, $\underline{SD}$ = .73; neutral list, $\underline{M}$ = 3.50, $\underline{SD}$ = 1.10). Relevant to interpretation of processing speed, the three lists were comparable in their rated meaningfulness (Type A list, $\underline{M}$ = 4.70, $\underline{SD}$ = .16; Type B list, $\underline{M}$ = 4.57, $\underline{SD}$ = .24; neutral list, $\underline{M}$ = 4.64, $\underline{SD}$ = .26), with all lists composed of easily understood words. Also relevant to examination of processing speed, the three lists were comparable in their average word length (Type A list, $\underline{M}$ = 8.77, $\underline{SD}$ = 2.21; Type B list, $\underline{M}$ = 7.91, $\underline{SD}$ = 1.76; neutral list, $\underline{M}$ = 8.13, $\underline{SD}$ = 2.40). The results of this pilot phase indicate that the word lists differ in content (Type A, Type B, neutral) but not desirability or meaningfulness. Thus interpretation of endorsement rates and processing speed are not hampered by response biases

arising from list differences unrelated to content.

Procedure

Subjects participated in what they were told was a two phase experiment on self-concept and its relationshp to task performance.

Phase I. During the initial phase, subjects completed the student form (Form T) of the Jenkins Activity Survey (JAS; Krantz, Glass, & Snyder, 1974) in order to assess their Type A/B status. The student form of the JAS is modeled after the adult version with the exception that items regarding job involvement have been replaced with items involving academic activities. Although the JAS Form T has been the standard assessment procedure for college-aged populations, it must be recognized that the JAS has been found to correlate only modestly with the Structure Interview, an assessment procedure that bases Type A and B classification on verbal and nonverbal responses in addition to content of answers (see Matthews, 1982; Musante et al., 1983). We return to this issue of assessment correspondence in the discussion. In addition, subjects were presented a list of the 66 self-descriptive adjectives (in random order) and were asked to rate themselves using 9-point scales bounded by "not at all like me" and "very much like me". The self-descriptive ratings for the 66 adjectives provided one check on the adequacy of their classification as Type A relevant, Type B relevant, or neutral. Phase I measures were group-administered.

Phase II. Subjects participated individually in the second phase of the study a minimum of two weeks following the first phase. During the second phase subjects were exposed to a series of tasks, two of which were designed to examine their self-schematic organization of Type A and B behavior. Presentation of all tasks, and recording of subjects' responses, were automated via small computer. Different experimenters conducted Phases I and II.

The first task was modeled after the trait endorsement procedure developed by Markus (1977). Subjects were seated in front of a computer terminal and shown two keys

labelled "Like Me" and "Not Like Me" respectively. The experimenter explained that self-descriptive words would appear on the screen. The subject was to examine the word, decide if the word was descriptive of his/her behavior most of the time, and press the appropriate key. The computer generated a different random order of words for each subject. Each word remained visible on the terminal screen until the subject depressed one of the two keys. A key press caused the screen to go blank for 3 seconds, after which a new word appeared. Unknown to the subject, the computer automatically recorded the amount of time it took to respond to each word following its appearance on the screen.

Following the adjective endorsement task, two tasks were performed that served dual purposes: (a) they provided an interference experience prior to a memory task that utilized the list of 66 adjectives, and (b) the two tasks have distinguished Type As and Bs successfully in the past. The first of these "filler" tasks required subjects to solve simple math problems (e.g., 6 + 9 - 2 = ?) which were generated randomly by the computer. Subjects were instructed on how to enter their answers into the computer (by pressing number keys followed by a "send" key), and how to correct mistakes made by hitting the wrong keys. Pressing the "send" key automatically produced a new problem on the screen. Subjects were allowed two practice trials to insure they understood the instructions. Following the two practice trials, subjects attempted two sets of the math problems. The initial set of problems were performed without an explicit deadline and without knowledge that a second set of math problems would follow the first. Subjects were told to continue solving problems until told to stop. All subjects were stopped after five minutes (by the computer), with their total number of attempts and errors automatically recorded. Next subjects were told that they would attempt another set of problems where their task was to solve as many as they could in five minutes. Again, the computer automatically recorded the number of attempts and errors. Past research using similar procedures has found that Type As tend to work under all conditions as if there

were an imposed deadline, whereas Type Bs tend to increase their efforts when a deadline is explicit relative to a no deadline condition (cf. Burnam, Pennebaker, & Glass, 1975). Accordingly, we expected a greater gain in the number of problems attempted from first to second sets by Type Bs relative to Type As (all subjects should show some gain due to practice effects). During the first set (no deadline), Type As should attempt more problems than Type Bs because they appear to impose their own deadline when one is not explicitly imposed. Though past research has not indicated any differences in the number of errors by Type As and Bs on this type of task, it seems plausible to expect more errors by Type As due to their more time urgent style (cf. Glass, 1977).

The second filler task required subjects to estimate the passage of a minute while engaged in a distracting task. Following Burnam et al. (1975), Type As and Bs were asked to read aloud from a book until they thought one minute had passed. Previous research indicates that the time urgent style of the Type A leads them to underestimate the passage of a fixed time interval (cf. Burnam et al., 1975). Type Bs, on the other hand, tend to estimate time passage more accurately, or overestimate time passage, relative to Type As. We expected a similar pattern of results.

The final task tested the subjects' recognition memory and constituted the second major test of self-schemata. During this task, subjects attempted to memorize 33 of the 66 adjectives from the word list used during the first task. Each of the 33 words was presented on the terminal screen for 5 seconds and subjects were instructed to simply sit back and attempt to memorize them. The 33 words were selected automatically by the computer according to the following ideographic constraints: (a) Eleven words from each sublist (Type A, Type B, and neutral) were chosen, (b) within each sublist, and to the extent possible, approximately equal numbers of words rated as "like me" and "not like me" were chosen (exactly equal numbers were not possible; whether 5 or 6 of either kind were selected was randomly determined), and (c) within the previous two constraints, words were selected randomly. The order of the selected list of 33 words was random-

ized by the computer and presented automatically. Immediately following presentation of the memory list, the entire list of 66 words was presented to the subject, one at a time in random order, to test recognition memory. Subjects were shown two keys labelled "new" and "old" respectively. Subjects were told to press the key labelled "new" if the word on the screen had not appeared on the previous memory list and to press the key labelled "old" if the presented word had appeared on the memory list. During the recognition task, the computer presented words, and recorded the subject's recognition response. A word remained on the screen until either the "new" or "old" button was pressed. For exploratory purposes, the reaction times for each memory decision were recorded automatically by the computer.

Following completion of the recognition task, the study was concluded, and the subjects thoroughly debriefed. Probes for suspicion during debriefing indicated very little skepticism, with no subjects reporting knowledge of the study's true purpose.

Results

For purposes of analysis, subjects were classified as Type A (JAS scores ≥ 9, n = 22) or Type B (JAS scores ≤ 8, n = 20) based on a median-split of scores on the Jenkins Activity Survey (Md = 8.6). Preliminary analyses indicated the absence of sex differences, thus results reported below are collapsed across sex of subject (There were similar proportions of males and females among Type A and B groups.) Because some subjects failed to complete all materials, df vary slightly.

Adjective Ratings

Subjects' self-descriptive ratings during the initial phase of the study provided one means of verifying the intended content differences in the 66-word list. Subjects' ratings were averaged over the 22 adjectives comprising the Type A, Type B, and neutral sublists, thus each subject contributed three average ratings to the analysis. The ratings were examined using a 2(Subject Type: Type A or B) x 3(Word Type: Type A, Type B, or neutral) analysis of variance with the latter factor treated as a repeated measure.

Results indicated a significant word type x subject type interaction ($F(2,78) = 7.61$, $p < .001$). Table 1 contains the means for interpreting this interaction. Additional analyses within word type indicated that Type As, compared to Type Bs, provided higher ratings in response to Type A adjectives ($t(39) = 2.83$, $p < .01$), but lower ratings in response to Type B adjectives ($t(39) = 2.41$, $p < .025$).[1] Type As and Bs did not differ in their ratings for neutral words ($t(39) = .74$). Contrasts within subject type indicated that Type As rated the Type A words as more self-descriptive than the Type B words ($t(78) = 4.13$, $p < .001$), rated the neutral words as more self-descriptive than the Type B words ($t(78) = 2.50$, $p < .025$), and tended to rate the Type A words as more self-descriptive than the neutral words ($t(78) = 1.53$, $p < .10$). Type Bs, on the other hand, tended to rate the Type B words as more self-descriptive than the Type A words ($t(78) = 1.38$, $p < .10$), but did not provide reliably different ratings for Type A and neutral words ($t(78) = .67$), or for Type B and neutral words ($t(78) = .71$). Taken together, the above pattern of results provides evidence for the intended content differences between sublists (further evidence is provided below with respect to endorsement rates).

Insert Table 1 about here

An additional characteristic of self-schemata is that the content forms a coherent cluster of interrelated traits. In the language of psychometric theory self-schemata are assumed to be internally consistent. If the Type A and B word lists provide adequate representations of Type A and B content then they should exhibit internal consistency (as measured by coefficient alpha). The neutral list, on the other hand, should exhibit trivial internal consistency because it was not designed to represent a clear dimension. Internal consistency analyses verified these expectations. Among Type As, internal consistency estimates were high for the Type A list ($r = .75$) and Type B list ($r = .84$) but low for the neutral list ($r = .29$). Similarly, analyses for Type Bs indicated high internal consistency

for the Type A list (r = .78) and Type B list (r = .89) but low internal consistency for the neutral list (r = .20).

Adjective Endorsement

Data collected during the initial adjective endorsement task of the second phase yielded two distinct types of information: (a) number of adjectives endorsed as self-descriptive (i.e., "like me") and, (b) the amount of time to decide that an adjective was self-descriptive or not. The number of adjectives endorsed as self-descriptive provides an additional and more critical check on the sublist content differences. These frequency data were examined using a 2(Subject Type: Type A or B) x 3(Word Type: Type A, Type B, or neutral) analysis of variance with the latter factor treated as a repeated measures. The only reliable effect to emerge from the analysis was the subject type x word type interaction ($F(2,80) = 11.90$, $p < .001$). As the means in Table 2 indicate, the expected pattern of endorsements was obtained. Additional contrasts indicated that Type A subjects endorsed reliably more Type A words as self-descriptive than did Type B subjects ($t(40) = 4.09$, $p < .001$). An opposite pattern emerged with respect to Type B words ($t(40) = 3.31$, $p < .005$), and no reliable differences were obtained with respect to endorsement of neutral words ($t(40) = .30$). Analyses within subject type indicated that Type As endorsed more Type A than Type B words as self-descriptive ($t(80) = 2.91$, $p < .005$). The number of neutral words endorsed did not differ reliably from the number of Type A words endorsed ($t(80) = .78$), but was reliably larger than the number of Type B words endorsed ($t(80) = 2.09$, $p < .05$). Type B subjects endorsed reliably more Type B than Type A words ($t(80) = 3.96$, $p < .01$). The numbers of neutral words endorsed by Type Bs were not reliably different from the number of Type B words endorsed ($t(80) = 1.29$), but were reliably larger than the number of Type A words endorsed ($t(80) = 2.67$, $p < .01$). These results provide strong evidence for content differences in the adjective lists, with both Type As and Bs responding to those differences.

Insert Table 2 about here

An examination of internal consistency of endorsements was also undertaken. Paralleling the results for the rating data, Type As exhibited considerable internal consistency on the Type A list (r = .73) and Type B list (r = .72) but no internal consistency on the neutral list (r = 0). Likewise Type Bs exhibited considerable internal consistency on the Type A list (r = .76) and Type B list (r = .80) but little consistency on the neutral list (r = .37).

Taken together, the adjective rating data and adjective endorsement data provide converging and compelling evidence for the intended list differences. Note, however, that the adjective endorsements and ratings do not themselves provide compelling evidence for the existence of self-schemata. Rather they provide a self-report format that is amenable to investigation of processing speed and memory interference. An extensive description of list development has been provided because the validity of the subsequent hypothesis tests rests on the adequacy of the constructed lists.[2]

Endorsement Decision Time

The endorsement decision time data were examined using a 2(Subject Type: Type A or B) x 3(Word Type: Type A, Type B, or neutral) x 2(Endorsement Type: "Like Me" or "Not Like Me") analysis of variance.[3] The latter two factors were treated as repeated measures. Results indicated a reliable main effect for word type ($F(2,80) = 13.78$, $p < .001$), and a reliable main effect for endorsement type ($F(1,40) = 27.48$, $p < .001$). both of which were qualified by a reliable subject type x word type x endorsement type interaction ($F(2,80) = 4.74$, $p < .025$). The triple interaction was reflected in a pattern of means that supported the hypothesis that Type As and Bs would differ in their decision times for schema-compatible vs. schema-incompatible decisions (see Table 3).

Insert Table 3 about here

Additional analyses were conducted to clarify the nature of this complex interaction. Contrasts computed within subject type and word type indicated that among Type A subjects, reliably faster decisions were made when Type A words were endorsed as self-descriptive than when they were endorsed as not self-descriptive ($t(40) = 4.29$, $p < .001$). For Type B words, Type As provided faster decisions when claiming an adjective was not like them than when claiming an adjective to be self-descriptive, but the difference was not reliable ($t(40) = .42$). Likewise, endorsements for neutral words did not differ reliably ($t(40) = .97$). Contrasts within endorsement type indicated that Type As were reliably faster when claiming a Type A word to be self-descriptive than when claiming a Type B word to be self-descriptive ($t(40) = 2.62$, $p < .025$). A nonsignificant difference in the opposite direction was obtained for Type A and B words endorsed as "Not Like Me" ($t(40) = 1.30$). Overall, the pattern of means is consistent with the view that Type As have a stable self-schema in the Type A/B domain; this cognitive structure allowed them to make schema-compatible decisions (i.e., Type A word - like me and Type B word - not like me) faster ($M = 2.54$ sec) than schema-incompatible decisions (i.e., Type B word - like me and Type A word - not like me, $M = 3.06$ sec, $t(40) = 2.81$, $p < .01$).

The pattern of means for Type Bs was also consistent with the possession of a self-schema in the Type A/B domain. Although endorsement decision times were not reliably different for Type A words ($t(40) = 1.14$), Type Bs responded significantly faster when endorsing a Type B word as self-descriptive than when claiming it to be nonself-descriptive ($t(40) = 3.58$, $p < .001$). Unexpectedly, Type Bs responded reliably faster when claiming neutral words to be self-descriptive than when claiming them to be nonself-descriptive ($t(40) = 1.75$, $p < .05$). Within endorsement type, self-descriptive endorsements for Type A and B words were not reliably different ($t(40) = .34$), but non-

self-descriptive endorsements for Type B words were reliably slower than for Type A words ($t(40) = 2.81$, $p < .01$). Paralleling the results for Type As, Type Bs made schema-compatible decisions more rapidly ($M = 3.02$ sec) than schema-incompatible decisions ($M = 3.40$ sec; $t(40) = 1.77$, $p < .05$).

Overall, both Type As and Type Bs made self-relevant decisions compatible with their presumed self-schemata faster than incompatible decisions. An examination of the means in Table 3 indicates that this effect was due primarily to differences in decisions made within the content domain paralleling the behavior type. That is, for Type As the greatest difference in endorsement times occurred within the Type A list whereas the greatest difference for Type Bs occurred within the Type B list. The only patterns of means to diverge from expectations were the faster endorsement times produced by Type Bs when claiming Type A words as self-descriptive relative to Type A - Not Like Me and Type B - Like Me decisions, and their faster decisions when endorsing neutral words as self-descriptive rather than non-self-descriptive. These deviations will be addressed further following presentation of the remaining results.

Recognition Memory

It was hypothesized that if Type As and Bs possess self-schemata in the Type A/B domain, then those cognitive structures should exert reliable distortions on a schema-irrelevant memory task (cf. Rogers, Rogers, & Kuiper, 1979). Words that are compatible with an individual's self-schema should be quite salient in memory and more likely to intrude into responses on a schema-irrelevant memory task that uses such words. Subjects' errors during the memory task were transformed into proportions to equate for differing numbers of adjective type-endorsement type test items. These proportions were then analyzed using a 2(Subject Type: Type A, Type B) x 3(Word Type: Type A, Type B, neutral) x 2(Endorsement: Like Me, Not Like Me) x 2(Error Type: False Positive, False Negative) analysis of variance with the latter three factors treated as repeated measures. Because of the highly specific nature of the hypotheses, a priori

contrasts were used. Two such contrasts were computed, one each for false positive and false negative errors. The contrast for false positive errors examined the hypothesis that Type As would make more Type A schema-compatible errors than Type B schema-compatible errors, with the reverse pattern true for Type Bs. As expected, this pattern emerged (see Table 4) and was reliable ($t(40) = 1.82$, $p < .05$). The second contrast tested a parallel prediction for false negative errors. Although Type As made a proportionally greater number of Type A schema-compatible false negative errors than Type B schema-compatible false negative errors, and Type Bs exhibited the opposite trend (see Table 4), the contrast was not reliable ($t(40) = .66$). Thus false negative errors do not appear to provide a sensitive index of self-schema influence.

Insert Table 4 about here

Memory Task Decision Times

An exploratory analysis of memory task decision times was conducted to examine whether additional effects of self-schema influence could be uncovered. Decision times were log transformed and examined via 2(Subject Type: Type A, Type B) x 3(Word Type: Type A, Type B, neutral) x 2(Prior Endorsement: Like Me, Not Like Me) x 2(Memory List Status: Old, New) x 2(Reported Status: Old, New) factorial analysis of variance with the latter four factors treated as repeated measures. This analysis indicated that Type As made their memory decisions faster ($M = 1.61$ sec) than did Type Bs ($M = 1.96$ sec), $F(1,40) = 4.54$, $p < .05$. All subjects also tended to make correct decisions faster ($M = 1.64$ sec) than incorrect decisions ($M = 1.93$ sec) as indicated by a memory list status x reported status interaction ($F(1,40) = 40.41$, $p < .001$). This tendency was further qualified by subject type and word type ($F(2,80) = 4.36$, $p < .025$). The relevant means are displayed in Table 5. Additional analyses were conducted within subject type and word type. Among Type As, correct memory decisions were made faster than incorrect deci-

sions for Type A words ($t(80) = 2.60$, $p < .01$) and neutral words ($t(80) = 4.72$, $p < .001$), but not for Type B words ($t(80) = 1.34$). Among Type Bs, correct decisions were made faster than incorrect decisions for Type B words ($t(80) = 4.60$, $p < .001$) and neutral words ($t(80) = 3.73$, $p < .001$) but not for Type A words ($t(80) = .61$). In other words, both Type As and Bs made correct decisions faster than incorrect decisions except with word lists containing counterschematic information. Possible explanations for this pattern will be deferred until the general discussion.

Insert Table 5 about here

Math Problems and Time Estimation

Subjects participated in two tasks intervening between the endorsement procedure and the memory test. Although the major purpose of these tasks was to provide an interference experience prior to the memory task, they also were designed to elicit Type A/B differences. The first task involved the solution of simple math problems, first without a deadline, then with an explicit deadline. The performance of Type As, relative to Type Bs, was expected to be less influenced by the deadline manipulation. A 2(Subject Type: Type A or B) x 2(Deadline Condition) analysis of variance indicated no reliable differences between Type As and Bs, with all subjects attempting more problems under the deadline ($M = 94.9$) than no deadline condition ($M = 76.8$; $F(1,39) = 112.49$, $p < .001$). Analysis of errors, however, indicated that Type As made a greater proportion of errors during both phases ($M = .026$) than did Type Bs ($M = .013$); $F(1,39) = 9.10$, $p < .005$. The second task required subjects to estimate the passage of a minute. Type As and Bs did not differ reliably in these estimates, ($F(1,38) = .71$), with all subjects tending to provide overestimates ($M = 79.7$ sec.).

Discussion

Overall, the results of this investigation provide convergent evidence for schema-

tic organization of self-knowledge among Type As and Bs. An additional study was conducted, however, to clarify one pattern of obtained results. In particular, the endorsement decision time data (Table 3) suggest that the processing efficiency afforded by self-schemata is domain specific, operating for Type As within the Type A word list and for Type Bs within the Type B word list. Decision times did not differ for Type As and Bs for the Type B and A lists respectively. This pattern of responses suggests that Type As and Bs may organize self-knowledge in one domain (Type A or B) rather than using the entire dimension as an organizational framework. In other words, it may not be appropriate to view the Type A/B distinction as comprising polar opposites of a single dimension. Schematic organization in one domain may not require schematic organization in the other domain. Accordingly we thought it desirable to replicate this finding. We also wanted to determine whether the significant difference between endorsement times on neutral words for Type Bs would replicate.

Study 2

Subjects and Procedure

Twenty-six undergraduate volunteers (15 males, 11 females) participated in this study. The procedure represented a replication of the endorsement decision task from Study 1. As in Study 1, subjects completed the JAS to assess their Type A/B status. In this study, however, the JAS was administered after the endorsement task to determine whether it might have sensitized subjects in Study 1.

Results and Discussion

Subjects were classified as Type As (JAS score $\geq$ 9) or Type Bs (JAS score $\leq$ 8) based on a median-split of their scores on the Jenkins Activity Survey (Md = 8.75). The endorsement decision times are displayed in Table 6 and indicate a pattern of means closely resembling that obtained in Study 1.[4] The only reliable differences to emerge were the domain-specific decisions for Type As and Bs: Type As provided reliably faster decisions when claiming a Type A word as self-descriptive than when claiming a Type A

word to not be self-descriptive ($t(48) = 3.54$, $p < .001$); Type Bs provided faster decisions when claiming a Type B word to be self-descriptive than when claiming a Type B word to not be self-descriptive ($t(48) = 1.78$, $p < .05$). No other contrasts were reliable.

Insert Table 6 about here

General Discussion

The results of the present two studies provide preliminary evidence for self-schematic representation of the Type A and B behavior patterns. Two separate content domains, Type A and Type B, were constructed and found to be internally consistent. Type As and Bs provided predictable self-ratings and endorsements in response to these two domains, validating their intended content distinction. More importantly, however, the word lists provided a vehicle for examining the influence of underlying self-schemata on the processing of self-relevant information. In this regard, it was found that both Type As and Type Bs processed self-relevant information more efficiently when that information was compatible with the presumed underlying self-schemata. Furthermore, recognition errors on a schema-irrelevant memory task were more prevalent when the test word was a component of the presumed underlying self-schema, demonstrating the "false alarms effect" indicative of schema interference (Rogers, Rogers, & Kuiper, 1979). Thus it appears that Type A and B behavior represents an important invariance in the social experiences of Type As and Bs respectively.[5]

Although the data support the existence of self-schemata for both Type As and Type Bs, the evidence was somewhat weaker for Type Bs. For example, in Study 1, although Type Bs exhibited reliably faster Type B-like me than Type B-not like me decisions, they also exhibited reliably faster "like me" than "not like me" decisions for the neutral words. In the second study, the differences in decision times for Type Bs within the neutral list were not reliable, but the differences within the Type B list were weaker

than the differences obtained for Type As within the Type A list. There are several possible explanations that deserve mention. First, it could be that the Type B list did not capture the core components of Type B behavior, or that it contained multiple domains that obscured detection of the Type B domain. These explanations seem unlikely: (a) very stringent criteria were used to select words for the lists, (b) patterns of endorsements by Type As and Bs were virtually mirror images (see Table 2), and (c) internal consistency of items within the Type B list was so large as to make it unlikely that multiple domains were being assessed.

A second possibility is that Type As are more self-focused than Type Bs (e.g., Rhodewalt, 1984; Scherwitz, Berton, & Leventhal, 1978) and as a consequence have more fully developed, more elaborated, or more accessible self-structures. The present data cannot address the plausibility of this explanation. It is, however, amenable to future test. For example, if Type As are more self-focused in general than Type Bs then all of their self-structures should be more fully developed, not just those within the Type A domain. Furthermore, Type As should be more able than Type Bs to provide elaborate and detailed descriptions of past instances of schema-compatible behaviors. Finally, Type As should be more able than Type Bs to provide confident predictions about future schema-compatible behaviors. Even if this additional research did not demonstrate greater schema articulation for Type As than Bs, it would provide additional evidence for schema existence among Type As and Bs. The desirability of this future research should not, however, obscure the fact that convergent evidence from the endorsement and memory tasks in the present two studies indicates that <u>both</u> Type As and Bs appear to organize self-knowledge within the Type A/B domain.

The pattern of endorsement decision times suggests an additional topic for future investigation. It appears that the Type A and B domains may represent distinctly organized content clusters that can be represented independently as self-schemata. In other words, it appears that it may be inappropriate to consider Type A and Type B as mutually

exclusive categories, or polar opposites along a single dimension. Instead it may be more appropriate to consider the Type A and B domains as distinct independent entities.[6] If true, this would have both theoretical and empirical implications. Theoretically, it suggests that individuals could conceivably fall into one of four different classifications: schematic in the Type A domain but not the Type B domain, schematic in the Type B domain but not the Type A domain, schematic in both domains (dual schematics), or aschematic in both domains. The first two classifications would represent Type As and Bs as typically defined. The third group, schematic in both Type A and B domains, would appear to be similar to individuals classified as Type X by the Structured Interview assessment procedure (Rosenman, 1978), having clear characteristics of both Type As and Type Bs. The last classification, aschematic in both Type A and B domains, would appear to represent individuals for whom Type A and B behavior is not an important behavioral invariance, and for whom the Type A/B distinction is not relevant to the organization of self-knowledge. These distinctions would be crucial to theoretical accounts of Type A/B behavior. The aschematics would be outside the bounds of theoretical explanation because for them Type A/B is an irrelevant distinction. Those individuals schematic in one domain but not the other would presumably behave as classic Type As and Bs. Individuals schematic in both domains present a special challenge because theoretical formulations would need to specify when Type A or Type B behavior would predominate. Methodologically, the existence of four distinct subgroups would indicate the need for possible revisions in the way Type A and B behavior is assessed, and could contribute to the only moderate agreement between the JAS (a unidimensional measure) and the Structured Interview (which in principle allows multiple dimensions to emerge; see Matthews, 1982).

The presence of two distinct domains is, of course, only speculation at this point and much future research will be necessary to verify their existence. At least partial support, however, exists in the present research. If the above formulation is correct, then schematicity in the Type A domain should not be dependent on schematicity in the

Type B domain and four distinct groups should be identifiable. Furthermore, dual schematics and aschematics should have moderate scores on the JAS whereas individuals schematic in the Type A domain but not the Type B domain should have high JAS scores, and individuals schematic only in the Type B domain should have low JAS scores. Subjects (from both studies, n = 68) were classified as schematic or aschematic in the Type A and B domains based on a median split of the differences between Not Like Me and Like Me reaction times for Type A and B words respectively (a large positive difference in reaction times would be indicative of schematicity in that domain). As expected, four distinct and relatively independent groups emerged, and both dual schematics (M = 8.37, n = 16) and aschematics (M = 7.86, n = 14) scored near the mean of JAS scores whereas Type A schematics obtained higher JAS scores (M = 10.15, n = 20) and Type B schematics obtained lower JAS scores (M = 7.06, n = 18). An interesting task for future research will be to examine how these different individuals respond to experimental procedures traditionally used to elicit Type A and B behavioral differences.

It was previously noted that much research on Type As and Bs has focused on responses to self-relevant information and that a full understanding of such processes would benefit from consideration of self-schemata. It is thus desirable to consider several examples of how the present research might be integrated with past findings. One example is the responses of Type As and Bs to uncontrollable failure. Several studies have demonstrated that Type As, relative to Type Bs, respond to initial, brief exposure to uncontrollable failure with exaggerated attempts to regain control (e.g., Glass, 1977; Krantz, Glass, & Snyder, 1974, Matthews, 1979) but respond to extensive exposure to uncontrollable failure with greater passivity (i.e., learned helplessness). These results are consistent with the presence of Type A/B self-schemata. One influence of self-schemata is the rejection of counterschematic information (Markus, 1977). Failure information should constitute a greater threat to Type As than Type Bs because it is more counter to their self-definitions. Accordingly they should exert greater effort to

invalidate or explain the counterschematic evidence (via increased efforts at control or success, see also Clary & Tesser, 1983) and only give up after prolonged exposure to failure (which convinces them of the partial validity of the evidence).

A second example stems from results reported by Strube (in press) regarding the attribution styles of Type As and Bs. Strube found that when asked to consider hypothetical positive and negative outcomes, and make causal attributions for those outcomes, Type As were more self-serving, assuming greater causal responsibility for positive than negative events. One explanation for these results rests on the effects that self-schemata have on the recall of personal information. As Markus (1977) has demonstrated, schema-consistent information is more easily remembered and elaborated. Furthermore, it seems plausible that the ease with which past instances of success and failure can be recalled should influence attributions. The greater number of past instances of success, and their ease of recall, may imply dispositional influences that operate across diverse situations. Infrequent and difficult-to-recall failure episodes imply extenuating circumstances.[7] Thus Type As may be more self-serving in their attribution style because of the greater ease with which they can recall past success as a function of their self-schemata. Type Bs, on the other hand, probably have a more equal representation of success and failure instances in memory because their self-schemata are not as "success" biased as those of Type As.

A final example concerns control relinquishment decisions made by Type As and Bs. Strube, Berry, and Moergen (in press) have demonstrated that Type As allocate control over task responsibility in a relatively automatic fashion, often keeping control when its delegation would seem more sensible. Strube et al. argue that Type As have a control decision script characterized by an "I can do it better" attitude, and thus refuse to give up control even in the face of evidence indicating control should be relinquished. The existence of a Type A self-schema is, of course, consistent with this argument. Indeed, it seems likely that a Type A self-schema would operate to perpetuate such a

script or attitude in the face of contradictory or counterschematic information (cf. Markus, 1977). Type Bs, however, should be more influenced by evidence indicating that someone else might possess superior capabilities because such information would conflict less with their view of the self.

In addition to enhancing our understanding of self-relevant information processing by Type As and Bs, a consideration of self-schemata suggests important issues regarding the evaluation of others. For example, it has been demonstrated that self-schemata form an important basis for the evaluation of others (Fong & Markus, 1982; Markus & Smith, 1981) with individuals biased toward seeking and evaluating information about others that is consistent with their self-definitions (see also Lewicki, 1983). The similarity between judgments made about others and judgments made about the self may be due to the generally greater accessibility of self-related constructs (Higgins, King, & Main, 1982) or the greater confidence with which people make judgments in domains where they are expert (Fong & Markus, 1982). In both cases, implications are that the same person could be judged differently by individuals with different self-schemata. Given the importance of the Type A/B distinction in the achievement and performance domains, it seems particularly important to examine how Type A and B self-schemata influence judgments of others. And, given our previous comments about the potentially greater accessibility of self-structures for Type As, it could be that Type As are more prone than Type Bs to judge others according to some self-standard.

The existence of Type A/B self-schemata also has practical implications. The validation of a link between behavior pattern and cognitive organization of self-knowledge should be an important consideration in future attempts at intervention with Type As. To date, attempts to alter the Type A pattern have been met with only mixed and short-term success (see Matteson & Ivancevich, 1980; Price, 1982; Suinn, 1982). This may stem, in part, from a failure to address change at both the behavioral and cognitive levels. A consideration of self-schemata indicates that behavioral intervention attempts

can be expected to be met with considerable resistance because they involve the attempt to integrate counterschematic information into an existing well-structured self-schema. Knowledge of the reasons for this resistance may alter and enhance future intervention strategies.

Finally, some comment is necessary regarding the influence of self-schemata on the time taken to make recognition memory decisions. Recall that the first study explored this variable as a potential measure of self-schema impact. Results indicated that the tendency to make correct decisions more rapidly than incorrect decisions did not hold when subjects were considering test words from the domain counter to the presumed self-schema. One possible explanation is that counterschematic words were particularly difficult to integrate into memory (no available structure) and thus could not be recognized as efficiently on the recognition test. Thus the typical ease with which correct decisions were made did not emerge for counterschematic words. This conclusion is only tentative. Given the exploratory nature of this analysis it is best to await the outcome of more research as to the viability of recognition memory decision time as a useful measure of self-schema influence.

In summary, the present two studies verify the presence of self-schemata in the Type A and B domains. These cognitive structures should prove useful in developing more complete models for describing and predicting the ways that Type As and Bs attend to, process, and respond to information in their social worlds.

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Footnotes

[1]Contrasts are based on an appropriate pooling of error terms (see Kirk, 1968). Of the error terms pooled, the more conservative (smaller) df is used to test for significance.

[2]A copy of the adjective lists and the computer program for their presentation is available on request.

[3]The reaction times were log transformed prior to analyses to reduce heterogeneity of variances and remove the influence of extremely slow reaction times (i.e., remove positive skew in the distributions of reaction times). Nontransformed data produced the same pattern of means and reliable contrasts.

[4]In both studies there was a tendency for decisions made in response to neutral words to be made faster than decisions make in response to Type A or Type B words. This pattern of reaction times has also been obtained with respect to processing of sentences and their relevance to a schema. Hashtroudi, Mutter, Cole, and Green (1984) found that schema-irrelevant (neutral) information was processed more rapidly than schema-compatible or schema-incompatible information.

[5]The Type A pattern is composed of characteristics generally thought to be more typical of males than females (e.g., competitive, aggressive). A legitimate question can be raised as to whether research examining Type A/B self-schemata is actually uncovering gender-identity schemata. Research has, in fact, demonstrated that self-schemata organized along the gender dimension exist (e.g., Crane & Markus, 1982; Markus et al., 1982, see also Bem, 1981, 1982). However, only a trivial relationship between gender identity and Type A/B has been found (DeGregorio & Carver, 1980, masculinity r = .16, femininity r = -.01; see also Blascovich, Major, & Katkin, 1981), and these relationships must be interpreted with caution given the item overlap of the JAS with measures of gender identity. Furthermore, no sex differences emerged in the present research (and biological sex and masculinity/femininity are substantially correlated, see Blascovich et

al., 1981). Thus it seems reasonable to conclude that gender identity and Type A/B are represented fairly independently in the organization of self-knowledge.

[6]This distinction between Type A and B behavior as endpoints of one dimension, or independent entities, parallels a similar discussion by Bem (1981, 1982) and Markus (Markus, Crane, Bernstein, & Siladi, 1982; Crane & Markus, 1982) regarding the femininity-masculinity distinction.

[7]Support for this argument can also be found in studies indicating that depressives can more readily recall past failures than past successes (e.g., Lloyd & Lishman, 1975) and that depressives have a self-blaming attribution style (i.e., they take credit for failure and avoid credit for success; e.g., Seligman, Abramson, Semmel, & von Baeyer, 1979).

Table 1

Mean Self-Descriptive Ratings as a Function of

Subject Type and Word Type

	Word Type		
	Type A	Type B	Neutral
Subject Type			
Type A	6.19	5.26	5.84
Type B	5.51	5.83	5.67

Note. Individual ratings could range from 1 "not at all like me" to 9 "very much like me".

Table 2

Number of Words Endorsed as Self-Descriptive as a Function of Subject Type and Word Type

	Word Type		
	Type A	Type B	Neutral
Subject Type			
Type As	15.27	12.04	14.05
Type Bs	10.95	15.55	14.36

Note. Individual endorsements could range from 0 to 22.

Table 3

Endorsement Decision Time as a Function of Subject Type,

Word Type, and Endorsement Type

Subject Type	Endorsement Type	Word Type		
		Type A	Type B	Neutral
Type A	"Like Me"	2.29	2.88	2.40
	"Not Like Me"	3.25	2.79	2.34
Type B	"Like Me"	2.85	2.97	2.55
	"Not Like Me"	3.06	3.96	2.83

Note. Reaction times are displayed in original metric (secs).

Table 4

Proportion of Recognition Errors as a Function of Subject Type, Schema-Type, and Error Type

	Type A Schema-Compatible Errors		Type B Schema-Compatible Errors	
	False Positive	False Negative	False Positive	False Negative
Type As	.182	.264	.136	.255
Type Bs	.128	.255	.201	.290

Note. Type A schema-compatible false positive errors represented false claims that a word was on the memory list when that word had previously been rated in a Type A schema-compatible fashion (Type A word - Like Me; Type B Word - Not Like Me). Type A schema compatible false negative errors represented false claims that a word was not on the memory list and that word had previously been rated in a Type B schema-compatible fashion (Type A word - Not Like Me; Type B Word - Like Me). Type B schema-compatible errors derived in an analogous manner.

Table 5

Memory Task Decision Times as a Function of Subject Type, Word Type, and Decision Type

	Word Type					
	Type A		Type B		Neutral	
	Correct Decision	Incorrect Decision	Correct Decision	Incorrect Decision	Correct Decision	Incorrect Decision
Type As	1.51	1.74	1.52	1.64	1.42	1.85
Type Bs	2.02	2.09	1.71	2.19	1.71	2.09

Note. Correct decisions represent old/old and new/new memory list status/reported status decisions; incorrect decisions represent old/new and new/old decisions. Reaction times are displayed in original metric (secs).

Table 6

Endorsement Decision Time as a Function of Subject Type, Word Type, and Endorsement Type: Study 2

Subject Type	Endorsement Type	Word Type		
		Type A	Type B	Neutral
Type A	"Like Me"	2.23	2.91	2.47
	"Not Like Me"	3.69	3.26	2.91
Type B	"Like Me"	3.03	2.88	2.58
	"Not Like Me"	3.22	4.19	2.66

Note. Reaction times are displayed in original metric (secs).